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10/574,032	03/27/2006	Osamu Shimamura	1085-019USD1	8018
28863 7590 04/24/2008 SHUMAKER & SIEFFERT, P. A. 1625 RADIO DRIVE SUITE 300 WOODBURY, MN 55125				
EXAMINER ARCTERO, ADAM A				
ART UNIT 1795		PAPER NUMBER		
NOTIFICATION DATE 04/24/2008		DELIVERY MODE ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@ssiplaw.com

### Office Action Summary

**Application No.**

10/574,032

**Applicant(s)**

SHIMAMURA ET AL.

**Examiner**

ADAM A. ARCIERO

**Art Unit**

1795

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 March 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 March 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-856)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date 05/09/2006 and 09/21/2006

## DETAILED ACTION

### *Summary*

1. This is the initial Office action based on the Lithium-ion Battery and Method for its Manufacture application filed on 03/27/2006.
2. Claims 1-19 are currently pending and have been fully considered.

### *Priority*

3. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### *Claim Rejections - 35 USC § 102*

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

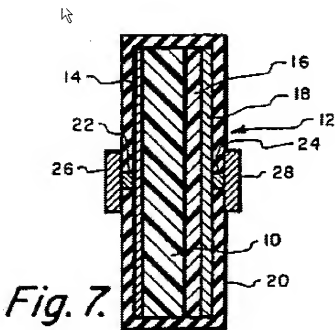
A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 2, 4, 6, 8-10 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by NAGASUBRAMANIAN et al. (US Patent No. 5,599,355 A).

As to Claims 1, 6 and 8, NAGASUBRAMANIAN et al. discloses a solid state lithium battery **12** which comprises an anode **14**, a composite solid electrolyte film **10** and a cathode **16** (col. 4, lines 50-61 and as shown in FIG. 7). The composite solid electrolyte film **10** comprises a polyelectrolyte such as polyethylene oxide (PEO), a lithium salt, and small sized, inorganic particles such as alumina (AL<sub>2</sub>O<sub>3</sub>), which is an inorganic oxide, (col. 4, line 62 to col. 5, line 12). A uniform suspension of lithium iodide salt coated alumina particles is produced (electrolytes occupying at least some of the interstitial spaces) (col. 5, lines 52-55).

As to Claim 2, NAGASUBRAMANIAN et al. discloses the battery according to claim 1, wherein the insulating particles (on the composite solid electrolyte film 10) are placed between the cathode 16 and the anode 14 so that the facing sides of the cathode 16 and the anode 14 do not contact each other, as can be seen in Figure 7 below.



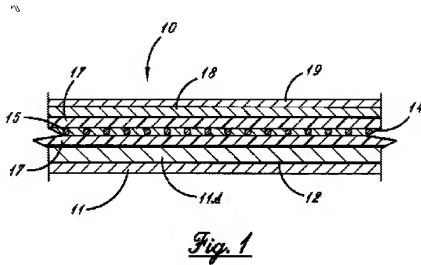
As to Claim 4, NAGASUBRAMANIAN et al. discloses the battery according to claim 1, wherein a composite solid electrolyte film was prepared with alumina with a particle size of 0.30 microns (col. 5, lines 35-46).

As to Claim 9, NAGASUBRAMANIAN et al. discloses the battery according to claim 1, wherein the cathode comprises a cathode active material which is formed using lithium transition metal composite oxides and wherein the anode comprises an anode active material that is formed using lithium ions in carbon (col. 1, lines 54-57).

As to Claims 10 and 13, amounts of LiI, alumina (insulating particles) and PEO (electrolytic polymer) were separately weighed. LiI was dissolved in acetonitrile and the solution decanted. Alumina was then added to the solution and stirred. Isopropyl alcohol (IPA) was then added and stirred well. Acetonitrile was then added with some more IPA. PEO (electrolytic polymer) was slowly added while being stirred. A suspension was produced and the mixture was stirred over night to dissolve the PEO and was then cast into films (electrolyte layer) (col. 5, lines 35-55). This teaches that the insulating particles and electrolytic polymer were applied separately to form a composite solid electrolytic film. The electrolyte layer is layered between a cathode and an anode, which are facing each other, as shown in FIG. 7 above.

6. Claims 17-19 are rejected under 35 U.S.C. 102(b) as being anticipated by KEJHA (US Patent No. 6,080,511).

As to Claims 17-19, KEJHA discloses a lithium ion polymer battery **10** with a cathode material **12** having an additional layer **14** of solid state polymeric electrolyte composite applied there (col. 3, lines 1-3). Said polymeric electrolyte composite (electrolyte layer) includes an electrically nonconductive woven or non-woven glass fiber net **15** (insulating particles, first coating), said net **15** is dip coated with polymeric material **17** such as polyethylene oxide (PEO) and an ester (electrolytic polymer, second coating). An additional layer **18** of an anode material is applied on top of said electrolyte layer, sandwiching the electrolyte layer between the anode and cathode (col. 3, lines 1-14 and Fig. 1). As seen below in Figure 1, the cathode and anode are facing each other, wherein lithium ions can be inserted into and removed from the cathode and the anode through the electrolyte layer (col. 2, lines 64-67).



7. Claims 1, 2, 5, 6, 8-10, 12, 14 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by HONG et al. (WO 03/065481 A).

As to Claims 1, 2, 6 and 8, HONG et al. discloses a lithium ion battery comprising a cathode, an anode, and a separation membrane installed between the anode and cathode (pg. 6, lines 6-12). Said separation membrane includes an inorganic filler (insulating particles) such as silica or alumina (inorganic oxides) (pg. 8, lines 16-19).

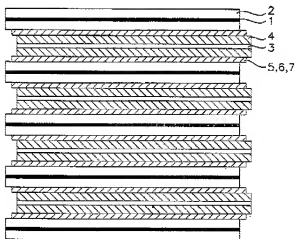
As to Claims 5 and 14, the thickness of the completed separation membrane polymer is created to be from 1-2 microns (pg. 17, lines 7-8). A roller having elastic rubber was used on the separation membrane comprising the polymer layer to improve the thick thickness problem (pg. 17, lines 6-10).

As to Claim 9, the anode comprises an anode active material of which is formed using a lithium transition metal oxide such as  $\text{LiCoO}_2$  (pg. 4, line 6-8), and wherein the cathode comprises a cathode active material that is formed using synthetic or natural graphite (pg. 14, lines 3-6).

As to Claims 10 and 12, HONG et al. discloses an electrochemical cell comprising an anode and a cathode with a separation membrane installed between said anode and cathode (Abstract). The separation membrane was manufactured by apply the insulating particles (silica) and an electrolytic polymer (PVdF) simultaneously to form a polymer layer which was then compressed on the woven separation membrane (pg. 16-17, example 1) placed between said anode and cathode.

As to Claim 15, HONG et al. discloses a stack of lithium secondary batteries in the form of a stacked mono cell including a separation membrane as discussed in claim 1 above. FIG. 4 (shown below) shows a cathode comprising a current collector **1** and a cathode active material **2** and an anode comprising a current collector **3** and an anode active material **4** which are attached together by a polymer binder **6** (pg. 16, lines 12-17). The polymer separation membrane (not labeled) is formed on the supporting body of the separation membrane (not labeled) is attached between the cathode and anode (pg. 16, lines 17-19).

FIG. 4



*Claim Rejections - 35 USC § 103*

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. Claims 3 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over NAGASUBRAMANIAN et al. (US Patent No. 5,599,355 A) in view of MUNSHI (US Patent No. 6,645,675 B1).

As to Claim 3, the disclosure of NAGASUBRAMANIAN et al. as discussed above is incorporated herein. NAGASUBRAMANIAN et al. does not expressly disclose the void ratio of the interstitial spaces to the insulating particles in the electrolyte layer.

However, MUNSHI teaches that in producing the polymer electrolyte film, after a mixture of a base polymer material with a lithium salt is dissolved in an organic solvent, the inorganic filler of silica or alumina is dispersed with a concentration in the range of 0.1-60% by volume of the final composition (col. 18, line 65-col. 19, line 5). A finely dispersed lithium ion conducting material is added in a concentration of about 0.1-80% by volume of the final composition (col. 19, lines 8-10). This concentration corresponds to the void ratio of the interstitial spaces to the insulating



particles in the electrolyte layer claimed in claim 3. The void spaces created by the inorganic filler (insulating particles) is equal to the volume occupied the lithium ion conducting material so as to further increase the conductivity, as suggested by MUNSHI (col. 18, lines 30-31). At the time of the invention, a person having ordinary skill in the art would have been motivated to modify the amount of inorganic filler in the composite solid electrolyte film of NAGASUBRAMANIAN et al. so that a void ratio of 0.1-80% of the interstitial spaces to the insulating particles can be obtained so that the conductivity can be further increased, as taught by MUNSHI (col. 18, lines 30-31). Also, according to MPEP 2144.05 [R-5], the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a *prima facie* case of obviousness exists [*In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)]. Also, according to MPEP 2144.05, “differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical”. “Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation,” (*In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)).

As to Claim 7, the disclosure of NAGASUBRAMANIAN et al. as discussed above in claim 1 is incorporated herein. NAGASUBRAMANIAN et al. does not expressly disclose the battery according to claim 1 wherein the insulating particles comprise olefin resins.

However, MUNSHI teaches a state of the art lithium ion battery using a carbon electrode as the anode and a lithiated metal oxide as the cathode. A microporous separator of polypropylene or polyethylene (olefin resin) is used for separating the two electrodes, with an electrolyte comprised of a lithium salt and a liquid organic solvent usually absorbed into said separator (col. 1, lines 43-54).

At the time of the invention, a person having ordinary skill in the art would have been motivated to substitute a microporous separator comprising a polyolefin resin such as polyethylene, as taught by MUNSHI, for the composite solid electrolyte film comprising alumina as inorganic fillers of NAGASUBRAMANIAN et al., because polyethylene is well known for being a great insulator for the electrodes and absorber of electrolyte for lithium-ion batteries and the substitution of one known element (separator comprising an olefin resin) for another (separator comprising alumina) would have yielded the predictable results.

11. Claims 5, 12, 14 and 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over NAGASUBRAMANIAN et al. (US Patent No. 5,599,355 A) in view of HONG et al. (WO 03/065481 A).

As to Claims 5 and 14, the disclosure of NAGASUBRAMANIAN et al. as discussed above in claims 1 and 10 is incorporated herein. NAGASUBRAMANIAN et al. does not expressly disclose the thickness of the electrolyte layer as being 10 microns or less.

However, HONG et al. discloses the thickness of the completed separation membrane polymer is created to be from 1-2 microns (pg. 17, lines 7-8). A roller having elastic rubber was used on the separation membrane comprising the polymer layer to improve the thick thickness problem (pg. 17, lines 6-10).

At the time of the invention, a person having ordinary skill in the art would have been motivated to modify the method of making the composite solid electrolyte film of NAGASUBRAMANIAN et al. with the roller of HONG et al. so a desired thickness of 1-2 microns can be obtained, as suggested by HONG et al. (pg. 17, lines 6-10), so that a much thinner and lighter weight battery that takes up a smaller amount of space may be obtained.

As to Claim 12, NAGASUBRAMANIAN et al. does not expressly disclose the method of applying the insulating particles and electrolytic polymer simultaneously.

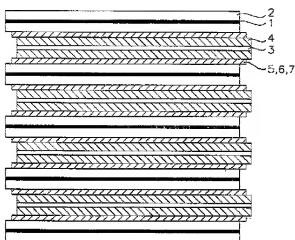
However, HONG et al. discloses an electrochemical cell comprising an anode and a cathode with a separation membrane installed between said anode and cathode (Abstract). The separation membrane was manufactured by apply the insulating particles (silica) and an electrolytic polymer (PVdF) simultaneously to form a polymer layer which was then compressed on the woven separation membrane (pg. 16-17, example 1) placed between said anode and cathode.

At the time of the invention, a person having ordinary skill in the art would have found it obvious to have a mixture of the insulating particles and electrolytic layer applied simultaneously instead of separately to achieve the same product, as suggested by HONG et al. (pg. 16 and 17, example 1) in order to increase production efficiency.

As to Claim 15, NAGASUBRAMANIAN et al. does not expressly disclose a battery assembly comprising multiple connected batteries.

However, HONG et al. discloses a stack of lithium secondary batteries in the form of a stacked mono cell including a separation membrane as discussed in claim 1 above. FIG. 4 (shown below) shows a cathode comprising a current collector **1** and a cathode active material **2** and an anode comprising a current collector **3** and an anode active material **4** which are attached together by a polymer binder **6** (pg. 16, lines 12-17). The polymer separation membrane (not labeled) is formed on the supporting body of the separation membrane (not labeled) is attached between the cathode and anode (pg. 16, lines 17-19).

FIG. 4



At the time of the invention, a person having ordinary skill in the art would have been motivated to stack the battery arrangement of NAGASUBRAMANIAN et al. as taught by HONG et al. in order to obtain a battery system which outputs more voltage depending on the voltage needs of the battery application.

12. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of NAGASUBRAMANIAN et al. and HONG et al. as applied to claim 15 above, and further in view of TRIPLETT (US Patent No. 3,566,985).

As to Claim 16, the disclosure of the combination of NAGASUBRAMANIAN et al. and HONG et al. as discussed in claim 15 above is incorporated herein. The combination does not expressly disclose the battery assembly as being capable for powering a vehicle.

However, TRIPLETT teaches an electric vehicle driven by an electric motor which is powered by a DC battery having a plurality of cells (battery assembly) (Abstract).

At the time of the invention, a person having ordinary skill in the art would have found it obvious and been motivated to incorporate the battery assembly of the combination of

NAGASUBRAMANIAN et al. and HONG et al. into a vehicle to power said vehicle, as suggested by TRIPLETT (Abstract) because a battery is a clean power source instead of using an internal combustion engine.

13. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over NAGASUBRAMANIAN et al. (US Patent No. 5,599,355 A) in view of SPEAKMAN (WO 99/19900 A2).

As to Claim 11, the disclosure of NAGASUBRAMANIAN et al. as discussed above is incorporated herein. NAGASUBRAMANIAN et al. does not expressly disclose the method for applying the insulating particles and the electrolytic polymer for forming the electrolyte layer, by an ink-jet printing nozzle.

However, SPEAKMAN teaches that conducting polymers have a multitude of applications which are further enhanced by the ability of ink jet printing in applications such as catalysts and electrodes (pg. 22, lines 7-20). At the time of the invention, a person having ordinary skill in the art would have recognized that ink jet printing is well known in the art and that person would have been motivated to apply the insulating particles and electrolytic polymer by means of ink jet printing because ink jet printing provides a directly written pattern onto a wide variety of surfaces, as suggested by SPEAKMAN (pg. 22, lines 7-10).

14. Claims 3 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over HONG et al. (WO 03/065481 A) in view of MUNSHI (US Patent No. 6,645,675 B1).

As to Claim 3, the disclosure of HONG et al. as discussed above is incorporated herein. HONG et al. does not expressly disclose the void ratio of the interstitial spaces to the insulating particles in the electrolyte layer.

However, MUNSHI teaches that in producing the polymer electrolyte film, after a mixture of a base polymer material with a lithium salt is dissolved in an organic solvent, the inorganic filler of silica or alumina is dispersed with a concentration in the range of 0.1-60% by volume of the final composition (col. 18, line 65-col. 19, line 5). A finely dispersed lithium ion conducting material is added in a concentration of about 0.1-80% by volume of the final composition (col. 19, lines 8-10). This concentration corresponds to the void ratio of the interstitial spaces to the insulating particles in the electrolyte layer claimed in claim 3. The void spaces created by the inorganic filler (insulating particles) is equal to the volume occupied the lithium ion conducting material so as to further increase the conductivity, as suggested by MUNSHI (col. 18, lines 30-31). At the time of the invention, a person having ordinary skill in the art would have been motivated to modify the amount of inorganic filler in the electrolyte layer of HONG et al. so that a void ratio of 0.1-80% of the interstitial spaces to the insulating particles can be obtained so that the conductivity can be further increased, as taught by MUNISHI (col. 18, lines 30-31). Also, according to MPEP 2144.05 [R-5], the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a *prima facie* case of obviousness exists [*In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)]. Also, according to MPEP 2144.05, “differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical”. “Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation,” (*In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)).

As to Claim 7, the disclosure of HONG et al. as discussed above in claim 1 is incorporated herein. HONG et al. does not expressly disclose the battery according to claim 1 wherein the insulating particles comprise olefin resins.

However, MUNSHI teaches a state of the art lithium ion battery using a carbon electrode as the anode and a lithiated metal oxide as the cathode. A microporous separator of polypropylene or polyethylene (olefin resin) is used for separating the two electrodes, with an electrolyte comprised of a lithium salt and a liquid organic solvent usually absorbed into said separator (col. 1, lines 43-54).

At the time of the invention, a person having ordinary skill in the art would have been motivated to substitute a microporous separator comprising a polyolefin resin such as polyethylene, as taught by MUNSHI, for the composite solid electrolyte film comprising alumina as inorganic fillers of HONG et al., because polyethylene is well known for being a great insulator for the electrodes and absorber of electrolyte for lithium-ion batteries and the substitution of one known element (separator comprising an olefin resin) for another (separator comprising alumina) would have yielded the predictable results.

15. Claims 4 and 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over HONG et al. (WO 03/065481 A) in view of NAGASUBRAMANIAN et al. (US Patent No. 5,599,355 A).

As to Claim 4, the disclosure of HONG et al. as discussed above is incorporated herein.

However, HONG et al. does not expressly disclose the mean radius of the insulating particles as being in the range of 0.05-10 microns.

However, NAGASUBRAMANIAN et al. discloses the battery according to claim 1, wherein a composite solid electrolyte film was prepared with alumina with a particle size of 0.30 microns (diameter) (col. 5, lines 35-46).

At the time of the invention, a person having ordinary skill in the art would have been motivated to substitute the insulating particles comprising alumina with a particle size of 0.30 microns of NAGASUBRAMANIAN et al. in place of the alumina particles of HONG et al. into the separation membrane of HONG et al. in order to increase the electrical performance, as suggested by NAGASUBRAMANIAN et al. (col. 5, lines 64-67) of the composite solid electrolyte film while maintaining structural integrity, (col. 2, lines 20-21). Also, according to MPEP 2144.05, for example, “claim reciting thickness of a protective layer falling within a range of “50 to 100 Angstroms” considered *prima facie* obvious in view of the prior art reference teaching that “for suitable protection, the thickness of the protective layer should be not less than about 10 nm (100 Angstroms),” [*In re Geisler*, 116 F.3d 1465, 1469-71, 43 USPQ2d 1362, 1365-66 (Fed. Cir. 1997)]. The court stated that “by stating that suitable protection is provided if the protective layer is about 100 Angstroms thick, the prior art reference directly teaches the use of a thickness within applicant’s claimed range.” Also, according to MPEP 2144.05, *Peterson*, 315 F.3d at 1330, 65 USPQ2d at 1382, “The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages.”

As to Claim 13, HONG et al. does not expressly disclose the method according to claim 10, wherein the insulating particles and electrolytic polymer are applied separately to form a solid electrolyte battery.

However, NAGASUBRAMANIAN discloses a method wherein amounts of LiI, alumina (insulating particles) and PEO (electrolytic polymer) were separately weighed. LiI was dissolved in acetonitrile and the solution decanted. Alumina was then added to the solution and stirred. Isopropyl alcohol (IPA) was then added and stirred well. Acetonitrile was then added with some



more IPA. PEO (electrolytic polymer) was slowly added while being stirred. A suspension was produced and the mixture was stirred over night to dissolve the PEO and was then cast into films (electrolyte layer) (col. 5, lines 35-55). This teaches that the insulating particles and electrolytic polymer were applied separately to form a composite solid electrolytic film. The electrolyte layer is layered between a cathode and an anode, which are facing each other, as shown in FIG. 7 above. At the time of the invention, a person having ordinary skill in the art would have found it obvious and well known in the art that the method of NAGASUBRAMANIAN et al. wherein the insulating particles and electrolytic polymer may be applied individually as opposed to simultaneously can be substituted for the method used by HONG et al., wherein said particles and polymer were applied simultaneously, and obtain the same product.

Furthermore, the courts have held that the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results, In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946).

16. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over HONG et al. (WO 03/065481 A) in view of SPEAKMAN (WO 99/19900 A2).

As to Claim 11, the disclosure of HONG et al. as discussed above is incorporated herein. HONG et al. does not expressly disclose the method of forming the electrolyte layer is accomplished by applying the insulating particles and the electrolytic polymer through a nozzle of an ink-jet printer.

However, SPEAKMAN teaches that conducting polymers have a multitude of applications which are further enhanced by the ability of ink jet printing in applications such as catalysts and electrodes (pg. 22, lines 7-20). At the time of the invention, a person having ordinary skill in the art would have recognized that ink jet printing is well known in the art and that person would have been motivated to apply the insulating particles and electrolytic polymer by means of ink jet

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printing because ink jet printing provides a directly written pattern onto a wide variety of surfaces, as suggested by SPEAKMAN (pg. 22, lines 7-10).

17. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over HONG et al. (WO 03/065481 A) in view of TRIPLETT (US Patent No. 3,566,985).

As to Claim 16, the disclosure of HONG et al. of a battery assembly as discussed above in claim 15 is incorporated herein. HONG et al. does not disclose that the battery assembly is capable of powering a vehicle.

However, TRIPLETT teaches an electric vehicle driven by an electric motor which is powered by a DC battery having a plurality of cells (battery assembly) (Abstract).

At the time of the invention, a person having ordinary skill in the art would have found it obvious and been motivated to incorporate the battery assembly of HONG et al. into a vehicle to power said vehicle, as suggested by TRIPLETT (Abstract) because battery power is a clean energy source instead of using an internal combustion engine.

### ***Conclusion***

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ADAM A. ARCIERO whose telephone number is (571)270-5116. The examiner can normally be reached on Monday to Friday 8am to 5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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